

In the manuscript 'Rainfall analysis in mountain streams affected by torrential floods in Madeira Island, Portugal', the authors conduct a statistical analysis between different precipitation indicators of different time scales to identify critical thresholds relevant for torrential flows. This is potentially an interesting contribution to the academic literature, but requires some significant amount of clarifications and re-organization of the information to make it more comprehensible. I thus propose the following major revisions.

Abstract:

- According to the NHES submission guidelines, an abstract should be “be short, clear, concise”, which is commonly translated into 150-250 word limits. The current abstract has more than 400 words, and contains a lot of details not relevant to convey the key message of the paper. I would thus suggest that the authors shorten the abstract to increase the accessibility of this manuscript to the scientific community.

Introduction:

- The introduction starts off well explaining the concept of torrential flows and why (antecedent) rainfall events are critical to identify the risk of torrential flows and what the objective for the study is.
- However, lines 67-78 seem totally unrelated, discussing needs for rainfall measurement networks and either need to be better integrated or left out.
- Instead, authors could add a paragraph introducing the case study area and why they specifically look at torrential flows there. Are there numbers that support the criticality of this hazard? Is climate change threatening an increased risk of torrential flow, etc.

Data and Methods:

- This section could significantly be improved for readability if the authors would introduce clear subsections (and potentially subsubsections?).
 - One introducing and characterizing the case study area (which is currently done in between at different places in the manuscript),
 - another one introducing the full set of collected data (the current set-up is very confusing as it is not clear how and why different sets of rain gauges or specific events were used for the results in section 3.1 and 3.2 and 4),
 - one on the methods applied for the analysis where additionally to the CAPx equation (I like how the authors introduce the equation in 123, the power is now correctly shown?) methods to determine the 24h-max etc could be clearly described as well as the hydrological model and used equations.

- The clarity of the manuscript/method would benefit if the visualization of the methodology would reflect the elements of the sections. Similarly, to be a flow, it would be good to provide some sense for direction and ordering.

Rainfall Thresholds (Results): This chapter offers a lot of fruit for thought and some minor comments (see below).

- One major unclarity is how Figure 4 relates to the used input data. The authors mention that there are 7 torrential flow events in the considered time horizon (without 2023) and compare these values against annual P_{max24h} of years without (so 5 years left?). It is not clear how these events can be found back in Figure 4. There seem to be 13 orange dots, 11 light blue and 12 dark blue. Clarification what they mean and how they are related, would help support the claims made by the authors. Similarly, it is not clear what the vertical line represents.
- Regarding section 3.2: It is unclear to me, what the authors intend to do with this correlation analysis between different temporal scales in the context of torrential flow. While I was expecting that the authors might explore whether the choice of P_{max24} is accurate to predict torrential flows, the authors seem to go the other way around and discuss whether P_{max24} is well correlated with other P_{maxT} . Readers need more guidance in this section (and prior) to understand why this analysis is done and why it is relevant.

Estimation of peak discharges: It is unclear why this analysis is conducted.

Furthermore, the authors could consider visualizing the data of max discharge dependent on catchment size and/or P_{max24} . The current way of presenting the results in descriptive text makes it very hard to discover any sort of patterns. Again, clarifying why specific events are chosen for the analysis (and not all) would be an important information to add.

Discussion: I would encourage the authors to reorganize the discussion section to make clear what current limitations are of the study and how the findings of this study relate to findings of the research community. At times, it reads as part of the introduction of the case study (e.g. l. 451-461, 462-470, l.480-486). While other statements could benefit from more elaboration/linking to the results (e.g. l. 476-477, l.530-533) or unrelated to the topic of the manuscript (e.g. l.487-489, l.508-509). It would also be interesting to have a reflection on Table 5 which suggests that no matter what PAC is used, the P_{max24} threshold is always the same. Similarly, the discussion of uncertainty and limits of the study would be valuable to reflect on remaining research gaps.

List of minor comments:

- L.81: How is the secondary and tertiary objective linked to the information about torrential flows that has been the focus of the introduction?)
- L.123: The factors for P should be as a power, right?
- L.126: What is the sensitivity of choosing $k=0.9$ compared to $k=0.8$? Would it have influence on the proposed thresholds? The authors write later about low permeability of the study area (l.154), how does this relate to the choice of a high k value? Doesn't low permeability mean that water run-off is much higher, so less water infiltrates?
- L.214: Why was it necessary to include the rainfall event from 2023?
- L. 216: The authors mention that a statistical analysis is necessary for precipitation data from years with and without torrential flood records to detect patterns. It seems however, that the authors have done the analysis mostly by means of visual analysis using Fig. 4. More elaboration would be helpful to clarify how the statistical analysis between different years has been done.
- L.210: Why are the two events from 2011 not in Table 2 as well? Should the 2023 event also be added there (no information whether torrential flow occurred)
- **L.243:** Using the case of Dec/20 and Jan/21 is a bit misleading. The authors state in regards to the Dec/20 'daily and sub-daily maximum precipitation values (Table 3) were sufficiently high to cause catastrophic floods'. At the same time, the 2021 torrential event has even higher P_{max24} so following that logic, we cannot say that CAP15 plays a role here or not. Would be good to clarify.
- L. 295: Fig5 the axis are not readable.
- L.312: Why did the authors disregard the events in 2010 and 2011 (and 2023) for the analysis?
- L. 320: I strongly advise the authors to have a clear input data section in their introduction to explain consistently which data-sets are used for what and why those data-sets were chosen.
- L.345: Is figure 6 now using the information from torrential flow events, all inputs from between 2009 and 2021 or the extended data-set with the extra 6?
- L.365: Why are the authors only reporting these information for the five events and not the full set of 11 (?)
- L.550: I don't understand the asterisk. Has this been discussed beforehand? How do the authors make this claim?